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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/852,616	05/11/2001	Thomas G. Lang		5341

7590

04/01/2003

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EXAMINER

VASUDEVA, AJAY

ART UNIT

PAPER NUMBER

3617

DATE MAILED: 04/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/852,616

Applicant(s)

LANG ET AL.

Examiner

Ajay Vasudeva

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 13 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) 1-220 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 74-78, 143 and 144 is/are allowed.
- 6) ☐ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☐ Claim(s) See Continuation Sheet is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on 25 November 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

Continuation of Disposition of Claims: Claims rejected are 1-10,13-18,20-32,34-38,40,42,43,45-48,50,56,57,60-73,79,80,85-87,90,93-95,97,99-114,116-137,139-142,145,152-155,157-162,165-171,173-177,179-182,189-197,202-206,209-220 and 5760.

Continuation of Disposition of Claims: Claims objected to are 11,12,19,33,39,41,44,49,51-55,58,59,81-84,88,89,91,92,96,98,115,138,146-151,156,163,164,172,178,183-188,198-201,207 and 208.

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## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claim 145 is rejected under 35 U.S.C. 102(b) as being anticipated by Wipper.

Wipper describes a moving underwater surface, generally as claimed, having a closed cavity, and a method of providing a series of saw-tooth shapes on the surface (figure 3) to reduce drag.

3. Claims 1-10, 13-18, 20-32, 34-38, 40, 42, 43, 45-48, 50, 60-73, 79, 80, 85-87, 90, 93-95, 97, 99-114, 116-137, 139-142, 152-155, 157-162, 165-169, 175-177, 179-182, 189-197, 202, 203, 214-220 are rejected under 35 U.S.C. 102(e) as being anticipated by Lang ('829).

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Lang ('829) describes a watercraft, generally as claimed, having a strut (figure 10) for attaching a hydrofoil [3] (figure 1) to a hull of the watercraft. The hydrofoil comprises spanwise discontinuities on each surface for forming closed cavities [1] (figure 19A) in a rearward direction that close ahead of the trailing edge of the hydrofoil. A gas source [137] fills the cavities with gas, and a gas flow restrictor limits release of gas into the cavities (column 13, lines 48-50, and column 38). A trailing flap is positioned at the trailing edge of the hydrofoil (figure 21A). Fore-and-aft fences are provided on the hydrofoils (column 7; and column 13, lines 63-65). Automatic controls are provided for controlling a nose piece and the tail piece (column 15, line 35). Gas is supplied via gas ducts inside the hydrofoil (figure 19A). A gas remover [153] is mounted near the trailing edge, with a recycler provided for recycling the removed gas (column 8, lines 40-45). The hydrofoils are retractable rearward and upward (column 2, lines 65-67). Vertically-extending discontinuities are provided on the struts to form open cavities on each side of the struts (column 7). The struts taper in the downward direction (column 19, line 33). Propulsion drive shaft that are counter rotating (column 29, line 32) are connected to the propulsion system and located within the strut (figures 28 and 29). The propellers can be superventilating or supercavitating (column 29, lines 32-35). A bow lifting strut [45] is positioned near the front of the watercraft for stabilizing it in heave and pitch.

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Regarding the method claims 152-155, 157-162, 165-169, applicant may note that such methods in fact set forth all features of the hydrofoil elements described above, and are therefore inherent in process of assembling the hydrofoil as designed.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 56, 57, 170, 171, 173, 174, 204-206, and 209-213 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang in view of Barkley.

Lang describes a watercraft with a hydrofoil.

Lang is silent on the provision of upward angled tip portion on each end of the hydrofoil.

Barkley describes provision of upward turned tip sections on the hydrofoils..

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It would have been obvious for one skilled in the art at the time of the invention to provide the upwardly turned tip sections in the hydrofoil of Lang, as taught by Barkley. Having such tip sections would be advantageous as the inclined portion would provide stabilizing force to the watercraft when it tilts or rolls, thereby enabling the watercraft to maintain an even keel.

***Allowable Subject Matter***

6. Claims 74-78, 143 and 144 are allowed.

7. Claims 11, 12, 19, 33, 39, 41, 44, 49, 51-55, 58, 59, 81-84, 88, 89, 91, 92, 96, 98, 115, 138, 146-151, 156, 163, 164, 172, 178, 183-188, 198-201, 207, and 208 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

8. Applicant's arguments filed 11/18/2002 have been fully considered but they are not persuasive.

(A) Rejection of claims 1-10, 13-18, 20-32, 34-38, 40, 42, 43, 45-48, 50, 60-73, 79, 80, 85-87, 90, 93-95, 97, 99-114, 116-137, 139-142, 152-155, 157-162, 165-169, 175-177, 179-182, 189-197, 202, 203, 214-220 based on Lang '829.

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Regarding Claims 1-61, 125-142 and 152-174, applicant describes the instant invention as “an important new invention that seems simple, but is not, and requires a non-typical design approach.” The applicant then goes on to describe the design criteria of the instant invention.

***Examiner’s response:*** The examiner fully acknowledges the inventive design approach of the instant invention, as described in the specification. However, the applicant has not pointed out as to how the rejection based on Lang ‘829 is inappropriate, or how certain specific features being claimed in the instant invention are not shown or suggested by Lang ‘829. Applicant is reminded that the Office evaluates claims based on the broadest reasonable interpretation of the language of the claims, and not on what is being described in the specification of the instant application.

Regarding Claims 62-71, it is argued that the instant invention reduces the wetted surface of a hydrofoil nosepiece and smoothes the walls of an upper cavity to further reduce the drag of a hydrofoil with closed cavities. Further, the applicant states that this invention has a wetted nose section inclined at a large angle to the water flow, such as 60 degrees, and extending from the leading edge rearward to a span-wise lower discontinuity, which causes a lower boundary layer to separate from the lower surface and form a lower cavity, as well as an upper surface discontinuity causing an upper water boundary layer to separate from the upper surface of the hydrofoil and form an upper cavity rearward.

***Examiner’s response:*** Applicant’s attention is directed to figures 1 and 19A, showing a wetted nose section with lower and upper surface discontinuities. Such nose section on a



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hydrofoil would causes a lower boundary layer to separate from the lower surface and form a lower cavity, as well as cause an upper water boundary layer to separate from the upper surface of the hydrofoil and form an upper cavity rearward. Further, the language of the claims fails to specify that wetted nose section is inclined at an angle of 60 degrees to the water flow, as being argued.

Regarding Claims 79-100, applicant argues that a horizontal fence is provided to separate an upper superventilated cavity from a lower closed cavity. This permits the pressure in the lower cavity to be different from atmospheric pressure.

***Examiner's response:*** Applicant's attention is directed to column 6, lines 64-67 through column 7, lines 1-10, which describes provision of spanwise fences to separate an upper superventilated cavity from a lower closed cavity. Additionally, it may be noted that claim 79 recites a "horizontal fence for isolating the lower and upper regions", and not "horizontal fence provided to separate an upper superventilated cavity from a lower closed cavity" (emphasis added), as being argued.

Regarding Claims 101-104, applicant argues that hulls have an air-filled cavity on each side, and a separate cavity on the bottom surface.

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***Examiner's response:*** Applicant's attention is directed to column 7, lines 31-34, which describes provision of a cavity on each side, and also to column 7, lines 43-47, which describes provision of a cavity on the bottom surface, where fences isolate the bottom cavity from side cavities.

Regarding Claims 105-124, applicant states that the instant invention is different from Lang '829 in that they permit a vee-shaped foil with a sweep of at least 45 degrees to be used for partially lifting a hull above water.

***Examiner's response:*** Applicant's attention is directed to figure 18C, and to column 19, lines 59-60 that describe a vee-shaped foil with a sweep of 70.53 degrees, which meets the limitation of being at least 45 degrees

Regarding Claims 109-110, applicant summarily states that ventilating propulsors are not covered in Lang '829.

***Examiner's response:*** Applicant's attention is directed to column 29, lines 32-35, that describes ventilating propulsors.

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Regarding Claim 117, applicant summarily states that an underwater sound transmitter is not included in Lang '829, and is attached to the craft for transmitting a sound beam forward of the craft for frightening sea animals away from a path of the hydrofoil.

***Examiner's response:*** See column 4, lines 62-64.

Regarding Claims 122-124, applicant argues that the instant inventions describes use of vented propulsors of various kinds, which are not included in Lang '829.

***Examiner's response:*** Although the applicant argues that the instant invention describes a use of vented propulsors of various kinds, how such “various kinds of propulsors” are different from the propellers of Lang '829 has not been specified in the claims language or the arguments. The rejection is maintained.

Regarding Claims 143-144, the rejection based on Lang '829 has been withdrawn in view of applicant's arguments that the attached plate is recited as being perpendicular to the flow, outward about 90 degrees from a surface.

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Regarding Claims 152-181, applicant states that the claims recite a limitation of increasing the cavity contact angle in the surface behind the desired termination region.

***Examiner's response:*** Applicant's attention is directed to column 20, lines 38-39, that describes a surface 19.

Regarding Claims 175-181, applicant argues that the claims relate to replacing a normal nose piece with a single, angled plate that initiates both upper and lower cavities, reduces wetted area and smoothes the upper cavity wall.

***Examiner's response:*** The examiner notes that the independent claim does not recite the provision of any angled plate, let alone a single, angled plate. Claim 176 recites angling the nose section upward at a forward end, and claim 178 recites provision of flat plate perpendicular to the approaching water flow. Although Lang '829 does not show a nose piece with a single plate angled in its entirety, as being argued, this reference does meet the limitation of the claim as phrased. It may be noted that in a conical nose piece, such as shown in figure 11C, an upper portion above a centerline is angled upwards. Additionally, in figure 11A, the nose piece is shown as having a flat plate structure perpendicular to the approaching water flow.

Regarding Claims 193-201, applicant states that Lang '829 does not show a bow lifter that is positioned near a front of the craft for stabilizing the craft in at least heave and pitch conditions.

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***Examiner's response:*** Lang '829 shows a bow lifter (component 11 in figure 35E; and component 45 in figure 42C) that is positioned near a front of the craft for stabilizing the craft.

Regarding Claims 202-203, it is argued that Lang '829 does not show a bow lifter for a hydrofoil craft, or a fully submerged dynamically lifting vee-hydrofoil in plan view whose leading edges are swept at least 45 degrees. Claim 203 includes a swept back vee-hydrofoil in plan view having negative dihedral and foil tip regions that pierce the water surface at a design speed.

***Examiner's response:*** In Lang '829, see column 2, line 66; as well as column 11, line 41, and lines 47-49, which describe not only vee-hydrofoil, but also a method of pivoting up the hydrofoil structure, which will impart it a negative dihedral.

Regarding Claims 214-216, it is argued that Lang '829 does not show two lifting struts that are angled to the vertical.

***Examiner's response:*** See figure 30 and figure 31B, which show struts attached to tip sections of the hydrofoil, and in profile view of figure 30, are angled with respect to the vertical. (Also, column 23, lines 60-65).

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Regarding Claims 217-220, applicant argues that an above-water portion of the craft provides aerodynamic lift to augment hydrodynamic lift from a low drag hydrofoil, and additionally, an aft air stabilizer is provided.

***Examiner's response:*** See figure 44C, 44D, 44E, and 45.

(B) Rejection of Claims 52, 54, 55, and 145-151 based on Lang in view of Marentic et al. is withdrawn in view of applicant's arguments.

(C) Regarding the rejection of claim 145 based on Wipper '071, applicant argues that air cavities are trapped in large grooves or channels 83, formed between ribs 84, as seen in Figure 3. Since these grooves or channels, by definition, must extend above the cavity, Wipper cannot make use of the claimed invention with his geometry.

***Examiner's response:*** See figure 2. Wipper shows cavity region 66, with a plurality of ribs [68] extending the entire length of the cavity that impart a saw-tooth shaped profile. The portion 34 is the cavity closure region (figure 1). Since the saw-tooth shaped profile runs along the entire length of the cavity, it therefore meets the limitation of being present in the cavity closure region as well.

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(D) Regarding the rejection of Claims 52, 54, 55, and 145-151 based on Lang in view of Barkley, it is argued that Barkley does not teach modification of Lang by an addition of a tip hydrofoil to each end of a hydrofoil for reducing induced drag and for changing the flow pattern near each end of the hydrofoil; nor does it teach a use of a surface-piercing, upward-angled tip region at each end of a lifting hydrofoil which will provide a dynamic stabilization.

*Examiner's response:* Barkley clearly teaches use of tip hydrofoils [21s, 21p] to each end of a hydrofoil, as shown in figure 2. Use of such hydrofoils would reduce drag and change the flow pattern near each end of the hydrofoil, thereby providing dynamic stabilization. Further, when the modified watercraft of Lang '829 is planing at high speeds, the hydrofoil would be lifted to the near the water surface, which will then cause the upward-angled tip hydrofoil to pierce the water surface.

Rejection of claims 58 and 207 is withdrawn.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ajay Vasudeva whose telephone number is (703) 306-5992.

  
AV

March 29, 2003

  
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